

CRITERION ECONOMICS, LLC

1620 Eye Street N.W. Suite 800
Washington, D.C. 20006
Tel: 202-331-9444
Fax: 202-331-0149

Jeffrey A. Eisenach
Chairman

June 28, 2007

Honorable Kevin J. Martin, Chairman
Federal Communications Commission
445 12th St., SW
Washington, DC 20554

Re : Notification of Filing
WT Docket No. 06-150

Dear Chairman Martin:

The attached paper contains an analysis of the risks embedded in Frontline Wireless' proposed service rules that were filed in this proceeding. Because Frontline Wireless' proposal would require both the U.S. taxpayer and public safety to become its business partners, due diligence should be performed on its business model.

Sincerely,

A handwritten signature in black ink, appearing to be 'JE' with a stylized flourish.

Jeffrey A. Eisenach

cc: Michael J. Copps
Jonathan S. Adelstein
Deborah Taylor Tate
Robert M. McDowell
Erika Olsen
Bruce Gottlieb
Barry Ohlson
Renee Crittendon
Aaron Goldberger
Angela Giancarlo
Fred Campbell

DUE DILIGENCE: RISK FACTORS IN THE FRONTLINE PROPOSAL

BY JEFFREY A. EISENACH, PH.D.[†]

June 28, 2007

[†] Chairman, Criterion Economics and Adjunct Professor, George Mason University Law School. The author expresses thanks to Joseph Kraemer for helpful suggestions, but takes full responsibility for any errors or omissions. Support for this paper was provided by Verizon Communications. The opinions expressed are my own.

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I. EXECUTIVE SUMMARY

Frontline Wireless proposes to construct and operate a \$15-\$20 billion national broadband network utilizing 20 MHz of spectrum in the 700 MHz band, which it would share with public safety users. As described in filings before the Federal Communications Commission (FCC), in Congressional testimony, and elsewhere, the network ultimately would cover 99 percent of the U.S. population. Frontline would provide unconditionally preemptible wholesale services to commercial users, while giving public safety users priority access to 10 MHz of spectrum and use of the other 10 MHz during emergencies. Neither the U.S. government nor public safety agencies would pay anything to fund construction of the network, but public safety agencies would pay negotiated user fees for access, and be responsible for purchasing handsets and other user equipment. The rest would be funded by private investors and by Frontline's commercial customers.

The two keys to Frontline's proposal are the willingness of (1) public safety agencies to contribute 10 MHz of spectrum they have been allocated for broadband services and (2) the FCC to impose service rules that would encumber an additional 10 MHz of spectrum (the "E-Block") with both public safety and business model restrictions, substantially reducing the value of the spectrum at auction. In effect, Frontline is asking public safety agencies and the U.S. government to be its first investors, by capitalizing the firm with several billion dollars worth of "beachfront" spectrum.

While Frontline's early-stage financial investors will be able to exit through the usual means (typically an IPO), the multi-billion dollar government investment would hardly be "liquid." Once the plan is approved and Frontline is awarded a license to the spectrum,¹ it is

1. Under the Frontline proposal, other bidders could bid for the spectrum. For purposes of this analysis, I assume Frontline is the winning bidder.

difficult to imagine how it could be unwound. The FCC's history of recovering spectrum from private licensees who fail to meet build-out requirements is discouraging, as evidenced by the infamous NextWave episode. As for public safety, it will invest additional billions in handsets and other unrecoverable costs, and in any case will be dependent on the network for essential services.

For the past decade, the FCC has allowed market forces to evaluate the financial viability of prospective licensees' business models. In an open auction, where the risk of failure is borne virtually entirely by the private bidder, there is no need for the government to conduct a detailed financial analysis: Its investors have all the incentives to do so, and are in the best position to evaluate the risks and rewards involved. The Frontline proposal is a different matter: Frontline asks both U.S. taxpayers and public safety agencies to become its business partners, its first and largest investors.

Given the magnitude and permanence of the commitment involved, one would expect that the prospective investors—public safety agencies and the U.S. government—would conduct a certain level of due diligence. What will be the nature of the network constructed? What technologies will it use? How many towers will be required, and what will they cost? How will the build-out of the network—which must take place long before any revenues begin to flow—be financed? How many commercial customers does the firm expect to have, who will they be, and how much will they pay? And, what will Frontline need to charge public safety users to make up the difference between commercial revenues and what is required?

Yet, with the date for an FCC decision to either approve or disapprove the Frontline proposal rapidly approaching, none of these questions (or dozens more like them) has been systematically asked, let alone answered. Frontline has not provided even a rudimentary business plan, let alone the extensive financial projections, technological validation, marketing plans and

other backup materials private investors (including the very successful venture capitalists who are among the firms' financial backers) would require before making even a modest investment, let alone billions of dollars. Either Frontline doesn't have a fully formed business plan, or it has decided not to tell its prospective initial investors what it is.

In this paper, I outline some of the questions a proper due diligence exercise would seek to answer. I do so in part by constructing a rudimentary business model, based on the elements of the Frontline proposal that have been publicly unveiled and on reasonable assumptions regarding revenues, costs, financing and so forth. The model raises serious questions about Frontline's ability to accomplish its objectives. Specifically, using very favorable assumptions about everything from deployment schedules to penetration rates, the model projects that public safety would be required to pay over \$9 billion in access fees alone over the first six years the network is in operation (2013-2018) in order for Frontline to pay down its debt and begin returning dividends to its equity investors. To put the \$9 billion figure in perspective, it amounts to about a third of public safety's *total* projected spending on communications for first-responders. And, it does not include the cost of handsets and other equipment, which would be billions more.

The exercise here should not be viewed as taking the place of a proper due diligence process, or even reasonably approximating one. Properly conducted, the due diligence process for an investment of this size and scope would examine every aspect of the proposed business in grueling detail. It would include developing and validating *pro forma* income statements and balance sheets, conducting interviews with prospective customers, critically evaluating the capabilities of key personnel, validating key technological and market assumptions, and preparing a detailed plan for obtaining the financing necessary to get the business from start-up

to (hoped for) profitability. A proper due diligence process would also look critically at the risks facing the business, and the probability that it can overcome those risks.

Ultimately, it is the responsibility of the business owners to come forward with answers to all of these questions, and properly so: It is their business, and they are the only ones in a position to explain how it will work and why, at the end of the day, they believe it will succeed. This paper is designed to illustrate what, at the most basic level, a due diligence exercise would look like, and to identify some of the issues it would address. I conclude that the Frontline plan is unlikely to succeed financially, and that its first-round investors—the public safety agencies and the U.S. government—are likely to end up bearing the costs of that failure. If Frontline’s Silicon Valley backers have conducted serious due diligence that shows otherwise, they should produce it and allow it to be subjected to independent analysis. If not, or if they are not prepared to subject their plans to public scrutiny, the FCC should walk away from this particular “business opportunity.”

II. THE FRONTLINE PROPOSAL

A. Overview

On March 6, 2007, in response to the FCC's Ninth Notice of Proposed Rulemaking,² Frontline Wireless submitted comments to the FCC on proposed service rules for the spectrum in the upper 700 MHz band.³ Those service rules, which I discuss in more detail below, would place numerous conditions on a block of spectrum in the upper 700 MHz band. Frontline's proposal would require the creation of a 10 MHz "E-Block," which would be culled from the existing 20 MHz D-Block and would be adjacent to public safety's broadband spectrum allotment. Frontline also proposed that the E-Block be sold as a single nationwide license, and that the licensee have "unconditionally preemptible"⁴ access to public safety's broadband spectrum in the 700 MHz band. Furthermore, the E-Block licensee would have certain build-out requirements, and would "permit emergency preemption by public safety users on its commercial spectrum according to procedures, protocols, and fees defined in the agreement between the two parties."⁵ Also, "[t]he E Block licensee would be permitted to collect a negotiated reasonable network fee from public safety agencies using the network, to cover the

2. *In the Matter of Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010*; Ninth Notice of Proposed Rulemaking, PS Docket No. 06-229; WT Docket No. 96-86 (rel. Dec. 20, 2006) [hereinafter *Ninth Notice*]. For those unfamiliar with the 700 MHz debate, the 700 MHz spectrum is currently encumbered by broadcast TV stations between UHF channels 60 and 69. The 2005 Digital Television Transition and Public Safety Act of 2005 mandated the DTV transition by February 17, 2009, at which time the spectrum will be cleared. *See* Deficit Reduction Act of 2005, Pub. L. No. 109-171, 120 Stat. 4 (2006). Furthermore, the Act mandated that 60 MHz of the spectrum be sold at a competitive auction no later than January 28, 2008. A portion of the proceeds from the auction are designated to fund the DTV transition and the build-out of an interoperable network for public safety in the 700 MHz band. *See Ninth Notice, supra*.

The *Ninth Notice* also addressed how public safety's 700 MHz spectrum should be used. The FCC proposed that the 12 MHz of 700 MHz spectrum it had previously designated for "wideband" communications be used solely for broadband applications. To promote interoperability, the FCC also proposed that a single licensee be awarded this spectrum on a nationwide basis, and that this licensee also be permitted to use the 12 MHz of 700 MHz spectrum designated for "narrowband" communications for broadband use on a secondary basis. *Id.*

3. *In the Matter of Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Comments of Frontline Wireless, LLC, WT Docket No. 06-150 (March 6, 2007) [hereinafter *Frontline Service Rules*].

4. *Id.* at 16

costs that are attributable to public safety's use of the network infrastructure.”⁶ Finally, the licensee would be required to pursue a wholesale-only business model, offer open access to its network, and enable roaming for small carriers that use devices compatible with its network.⁷

On April 25, 2007, the FCC adopted a Further Notice of Proposed Rulemaking (FNPRM) that requested comments on the Frontline proposal.⁸ In the FNPRM, the FCC stated that it sought comment on the likely effect of Frontline's proposal on commercial and public safety users in the 700 MHz band and whether it is in the public interest for the FCC to adopt Frontline's proposal.⁹ Furthermore, the FCC sought comments on whether specific service rules were required to protect the public interest should the licensee under Frontline's proposal become insolvent.¹⁰

B. Spectrum Contributions by Public Safety and the U.S. Government

The key element of the Frontline proposal is the spectrum contributions that both public safety and the U.S. government would make to the E-Block licensee.

First, under Frontline's proposal, the E-Block licensee would have “secondary access” to public safety's 700 MHz broadband spectrum allotment.¹¹ It may well be, as Frontline argues, that it is economically efficient for a commercial provider to have shared use rights over some

5. *Id.*

6. *Id.* at 12.

7. *Id.* at 5, 6, 10, 18, 19. Also, see *In the Matter of Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Initial Comments of Frontline Wireless, LLC, WT Docket No. 06-150 (May 23, 2007) [hereinafter *Frontline FNPRM Comments*].

8. *In the Matter of Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency; Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephone Calling Systems; Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services; Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules; Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, Report and Order and Further Notice of Proposed Rulemaking, WT Docket No. 06-150; CC Docket No. 94-102; WT Docket No. 01-309; WT Docket No. 03-264; WT Docket No. 06-169; PS Docket No. 06-229; WT Docket No. 96-86 (rel. April 27, 2007) [hereinafter *FNPRM*]

9. *Id.* at ¶ 277.

portion of this public safety spectrum. However, the right to use such a valuable block of spectrum, even on a secondary basis, is likely worth well in excess of a billion dollars. Under Frontline’s proposal, the winner of the E-Block would be granted the right to use the public safety spectrum for free, in perpetuity. By transferring this right to Frontline, public safety is effectively making a “10-figure” investment in the company.

Frontline’s proposal also relies on a very large *de facto* investment by the U.S. government. Frontline’s service rules would have the effect – and, apparently, the intent – of excluding from participation in the auction all existing mobile wireless carriers – including smaller carriers such as Alltel, Dobson, Leap Wireless and U.S. Cellular (TDS), as well as the four national carriers, AT&T, Sprint, T-Mobile and Verizon. Indeed, a report by Andzej Skrzypacz and Robert Wilson of Stanford University, which was filed as an exhibit to Frontline’s comments to the FNPRM, advocates that incumbent wireless carriers be precluded from bidding for the E-Block license.¹² In their report, Skrzypacz and Wilson mention several ways in which incumbent carriers would be precluded from bidding on the E-Block, including a prohibition on leasing E-Block spectrum to retailers affiliated with an incumbent, and making new entrants eligible for bidding credits for which incumbents would not qualify.¹³

10. *Id.* at ¶ 289.

11. *Frontline Service Rules* at 15.

12. Andzej Skrzypacz & Robert Wilson, *The Design of the 700 MHz Spectrum Auction: An Opportunity to Promote Competition and Public Safety*, in re: Service Rules for the 698-746, 747-762, and 777-792 MHz Bands, WT Dkt. No 06-150, prepared for Frontline Wireless, May 23, 2007, at 4 [hereinafter Skrzypacz & Wilson].

13. *See, e.g.*, Skrzypacz & Wilson at 4 (“We discuss here one sensible approach: the FCC demarcates some of the 700 MHz spectrum for a licensee that will commit to selling at wholesale to all buyers and not primarily the top-two firms.”). The authors argue that the FCC *should* preclude incumbent carriers from bidding on the E-Block because those carriers (according to Skrzypacz and Wilson) have incentives to engage in spectrum hoarding. *Id.* at 17 (“If the FCC prevents the operator from withholding or hoarding the spectrum (in ways discussed in the next section) then the operator will have the right economic incentives to offer such ubiquitous connectivity.”). However, the paper’s analysis fails to demonstrate this point. *See* Gerald R. Faulhaber, Robert W. Hahn, & Hal J. Singer, *Should the FCC Depart from More than Decade of Market-Oriented Spectrum Policy?: Reply to Skrzypacz and Wilson*, June 13, 2007, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=993531. The authors made their case in stronger terms in a subsequent conference call with reporters. Corey Boles, *Report Argues For Limits On Spectrum Auction Participants*, DOW JONES NEWSWIRES, May 23, 2007 (“On Tuesday a report by two

Thus, the effect of Frontline’s service rules would be effectively to preclude bidding by most if not all of the most likely other bidders for the E-Block spectrum. As a result, Frontline would likely win the E-Block license at a fraction of what would be bid in an open auction. By asking the U.S. government to forgo a substantial portion of the revenues it would otherwise receive in the 700 MHz auction, Frontline is asking that it join public safety in helping to capitalize the company by making an investment that likely exceeds \$1 billion.¹⁴

C. Business Model Limitations

As noted above, Frontline’s proposal places significant limitations on the business model that the E-Block licensee could pursue. First, the E-Block licensee would be required to pursue a wholesale only strategy. As a component of the wholesale limitation, the licensee would be prohibited from leasing more than 24.9 percent of its capacity to any one retailer. Furthermore, the E-Block licensee would be precluded from leasing to an affiliated third party, and it must agree to an open access plan, allowing any unaffiliated third-party to have access to its network.

Californian economists that was commissioned by Frontline Wireless, concluded that large incumbent telecom operators such as Verizon Communications (VZ) and AT&T Inc.’s (T) wireless units, should be partially restricted from taking part in the auction. Speaking on a conference call hosted by a law firm representing Frontline, economists Robert Wilson and Andrzej Skrzypacz of Stanford University Business School, argued that the same partial ban should be extended to the large cable companies too.”). Wilson was later quoted as saying: “The incumbents have an enormous motivation to deter entry by competitors into their markets. They should be banned from bidding for this kind of specially-designated license.” *Id.* Frontline’s economists offered a similar policy recommendation to *Broadband Daily*. See Cheryl Bolen, *Economists Bolster Frontline Plan for Nationwide Broadband Network*, BROADBAND DAILY, May 23, 2007 (“Among the report’s recommendations, the FCC should essentially exclude incumbents from bidding on the E Block license.”). Wilson is later quoted as saying: “Because they have an undue incentive to deter entry, they should either be banned from bidding on the E Block or bidding credits should be given to new entrants.” *Id.*

14. In the analysis below, I assume that Frontline’s “closed auction” rules would result in a winning bid for the E-Block of \$650 million. The Congressional Budget Office estimated that an open auction sale of 60 MHz of spectrum would fetch between \$10 billion and \$15 billion at competitive auction. See *S. 1932: Deficit Reduction Act of 2005*, Congressional Budget Office Cost Estimate at 22 (Jan. 27, 2006), available at <http://www.cbo.gov/ftpdocs/70xx/doc7028/s1932conf.pdf> [hereafter *CBO Cost Estimate*]. Therefore the expected price of 10 MHz would be between \$1.67 billion and \$2.5 billion. Under these parameters, a \$650 million sale price would amount to a subsidy of between \$1 billion and \$1.85 billion. These figures are conservative, as they fail to account for the fact that a nationwide block of spectrum is more valuable than the regional blocks assumed in the CBO model. The amount of the winning bid is not a key parameter in the model. A lower figure implies a larger “investment” by the government, but has little effect on Frontline’s financial prospects.

Frontline justifies these restrictions by arguing they are needed to create opportunities for resellers to purchase access to spectrum at wholesale prices.

The E-Block licensee's business model would also face three different constraints related to the costs of building out its network to public safety specifications. First, the E-Block licensee would be required to provide service to areas that would not be profitable from the standpoint of a commercial service provider. Second, it would be required to provide quality of service obligations that a normal carrier would not be faced with. Third, the network must be hardened to withstand catastrophic events, such as a bombing or extreme weather emergency. As a result, the E-Block licensee will face higher build-out costs than would other commercial wireless carriers in the 700 MHz band.¹⁵

D. Public Safety Obligations

The E-Block licensee would also have several obligations to public safety. As I described above, the licensee must build out a nationwide network to public safety standards. That network must be compatible with both the E-Block spectrum and public safety's broadband spectrum allocation in the 700 MHz band. Furthermore, the E-Block licensee would "permit emergency preemption by public safety users on its commercial spectrum according to procedures, protocols, and fees defined in the agreement between the two parties."¹⁶

Frontline's proposal also prescribes build-out requirements to which the E-Block licensee must adhere. Ultimately, the E-Block licensee's network must reach 99 percent of the U.S. population. Within four years after auction, 75 percent of the population must be covered (which

15. Based on this point alone one could conclude that Frontline's business plan will likely fail. Because the wireless industry is competitive and because Frontline proposes to build a network to public safety's rigorous standards, Frontline will be unable to charge rates for wholesale access that are sufficient to cover its build-out costs, which will exceed those of a commercial operator. *See, e.g.,* Peter Cramton, Thomas Dombrowsky, Jeffrey Eisenach, Allan Ingraham & Hal Singer, *Improving Public Safety Communications: An Analysis of Alternative Approaches*, Feb. 6, 2007, at 12-13.

16. *Frontline Service Rules* at 16.

Frontline estimates to be 25 percent of U.S. geography), and 95 percent of the population (estimated at 50 percent of the CONUS landmass) must be covered within seven years.¹⁷

III. SOURCES OF COSTS AND REVENUES IN THE FRONTLINE BUSINESS PLAN

To construct a business plan for Frontline, I identify and provide rough estimates of its primary capital and operating costs, and its main sources of revenues. The assumptions I use are described below. When assumptions are necessary, I err on the side of optimism, giving the Frontline business model the benefit of the doubt.

A. Costs

Frontline's proposal would require the E-Block licensee to incur very large capital costs beginning soon after the 700 MHz auction ends. The company would also experience normal, yearly operating costs that would ramp up over the construction period.

1. Capital Costs

The first capital cost that the E-Block licensee would incur would be the cost of the E-Block spectrum. Since Frontline's proposal would exclude practically all other major bidders, it can expect to pay far less than would be the case in an open auction. For the purposes of my analysis below, I assume a winning Frontline bid of \$650 million.

The construction of the network will also impose significant capital costs on the E-Block licensee, and these costs will be incurred long before the company begins receiving revenues, a fact that Frontline itself acknowledges.¹⁸ Frontline estimates that the network constructed by the E-Block licensee will cost \$15 to \$20 billion.¹⁹ In constructing Frontline's business model, I assume that the cost to acquire, construct, install, test, and place in service the network is, on

17. *Frontline FNPRM Comments* at 40. In its earlier filing, Frontline stated it would cover 25 percent, 50 percent, and 75 percent of CONUS geography within years 4, 7, and 10 respectively. *Frontline Service Rules* at 12.

18. *Frontline FNPRM Comments* at 32.

19. *Id.* at 64.

average, \$600,000 per site.²⁰ I conservatively assume that this cost will be the same for all sites. In reality, sites built out in the first four years will be far more expensive, as those sites will be located in urban and suburban areas, which are more expensive to cover.

Frontline proposes to cover 99 percent of the population in the continental United States and Alaskan municipalities with more than 5,000 persons, which equates to approximately 75 percent of the U.S., or approximately 3 million square miles.²¹ Table 1 below lists the approximate square mileage and number of cell sites needed to cover the area associated with Frontline's build-out commitment.

TABLE 1: THE CUMULATIVE COST OF MEETING FRONTLINE'S COVERAGE REQUIREMENTS

Years After Auction	Geographic Coverage (%)	Coverage (Square Miles)	Average Cell Radius (mi)	Cell Sites Required	Cumulative Cost at \$600 k per Site (\$ million)
4	25 percent	761,000	2.9	28,809	17,285
7	50 percent	1,522,000	8	32,595	19,557
10	75 percent	2,283,000	15	33,672	20,203

The data in Table 1 show that, using conservative assumptions, the cumulative cost of constructing the network within 10 years would be \$20.2 billion, which is at the upper end of the Frontline estimate. Furthermore, the build-out cost would be frontloaded, since the E-Block licensee would be building out urban and suburban areas first, and those areas require a smaller

20. These costs include site acquisition, construction, and electronics. Furthermore, this cost includes all control components of the network. Therefore, \$600,000 represents the average per-site cost of the *entire network*. This is a conservative assumption considering that (1) almost all desirable cell site locations in urban areas have been located and are loaded, sometimes saturated by in-use cell sites and (2) the cost of a cell site in a rural area can be approximately \$400,000. *See e.g.*, Associated Press, *Proposed Cap on Subsidies for Rural Cell Towers Spurs Opposition*, BOSTON GLOBE, June 10, 2007, available at: http://www.boston.com/news/local/maine/articles/2007/06/10/proposed_cap_on_subsidies_for_rural_cell_towers_spurs_opposition/.

21. I used a geographic area equal to 3.7 million square miles and subtracted from that Alaska's total area of 663 thousand square miles. I then added back 7,600 square miles for Alaskan municipalities with more than 5,000 persons (Anchorage Municipality, Bethel City, College CDP, Eielson AFB CDP, Fairbanks City, Juneau City and Borough, Kalifornsky CDP, Kenai City, Ketchikan City, Knik-Fairview CDP, Kodiak City, Lakes CDP, Sitka City and Borough, Wasilla City). *See UNITED STATES CENSUS, 2000 CENSUS: SUMMARY FILE 3*, available at: www.census.gov.

cell radius.²² For example, public safety recently deployed a wireless broadband network in the 700 MHz band in Washington, DC.²³ That network required a cell radius of 1.5 miles.²⁴ Using a 2.9 mile radius assumption, one can expect the E-Block licensee's capital costs to be \$17.3 billion in the first four years. To achieve its objective of 75 percent geographic coverage by year 10, Frontline would need to invest in more than 33,000 cell sites and network control facilities, at a conservative cost estimate of \$20.2 billion.²⁵

2. Operating Costs

In its first four years of operation, Frontline's operating costs would include start-up costs associated with marketing, product development, human resources, and other G&A costs. I include these costs in the network cost assumptions described immediately above (making my assumption of \$600,000 per cell site still more conservative). Thus, they are capitalized and carried forward as debt once the company begins to provide service in year five.

In years five through ten of its operation, I assume that Frontline will have operating costs equal to 40 percent of its wholesale service revenues. I arrive at this assumption by comparing the 2006 *retail* wireless service revenues for Verizon Wireless and AT&T to the sum

22. Another extremely optimistic assumption that I make is that once Frontline has built out an area, its network investment in that area is sufficient to sustain its business in that area indefinitely. In reality, Frontline would have service up and running in major metropolitan areas after year 4 only to return to those areas in years seven, eight, and nine to add cell sites to improve network performance and to refurbish and replace sites that had been installed years ago.

23. U.S. DEPARTMENT OF COMMERCE, SPECTRUM POLICY FOR THE 21ST CENTURY—THE PRESIDENT'S SPECTRUM POLICY INITIATIVE, May 2007, at xiii [hereinafter, *Spectrum Policy*].

24. There are 68 square miles of land in Washington, DC. *See, e.g.*, Wikipedia, *Washington, DC*, available at: http://en.wikipedia.org/wiki/Washington,_D.C. The network required 10 cell sites to cover 68 square miles. *See Spectrum Policy* at 3-3. Simple algebra shows that a radius of 1.475 allows one to cover 68 square miles with 10 cell sites.

25. I also note that the assumption of an 8 mile radius to achieve 95 percent population coverage and a 15 mile radius to achieve 99 percent population coverage are both conservative. It is my understanding that commercial wireless carriers cannot generally achieve cell radii less than 10 miles, even in the most favorable geographic locations.

of their service costs plus 55 percent of their sales, general, and administrative costs.²⁶ Although Frontline would be a wholesale carrier, it still must provide billing and administrative services to three million first responders²⁷ located in tens of thousands of different localities, and must have resources in place to track and manage data and call volumes on its network, company data, and personnel files. Furthermore, Frontline cannot be expected to earn retail rates, therefore calculating its operating costs relative to retail revenues for major wireless carriers is especially conservative.

B. Revenues

The E-Block licensee's revenues will come from three sources: (1) mobile virtual network operators (MVNOs) to which it provides wholesale wireless service, (2) other wireless carriers to which it provides roaming, and (3) public safety users.

1. Wholesale Services

I assume that Frontline would be unable to provide service during the first four years of operation, during which time it would be constructing a network that could reach 75 percent of the CONUS population. If Frontline began its build-out on January 1, 2009, it would then be able to begin offering service by the start of 2013.²⁸ Revenues from wholesale service to MVNOs

26. Cellco Partnership (d/b/a Verizon Wireless), 2006 SEC Form 10-Q at 1 (Filed Nov. 6, 2006); Cingular Wireless LLC, 2006 SEC Form 10-Q at 1 (Filed Nov. 1, 2006). These two companies had, combined, \$49 billion in operating service revenues and \$10.86 billion in service costs. I add 55 percent of their combined 17.28 billion in SG&A costs to service costs and divide by 19.4 billion. The numbers used for both companies reflect 9 month revenues and costs ending September 30, 2006.

27. In an earlier petition before the FCC, Cyren Call estimated that there were 3 million first responders in the United States. *See In the Matter of Reallocation of 30 MHz of 800 MHz Spectrum (747-762/777-792 MHz) From Commercial Use Assignment of 30 MHz of 700 MHz Spectrum (747-762/777-792) to the Public Safety Broadband Trust for Deployment of a Shared Public Safety/Commercial Next Generation Wireless Network*, Petition for Rulemaking of Cyren Call Communications Corporation, RM Docket 11348 (rel. Apr. 27, 2006), at 7.

28. The assumption of a January 1, 2009 start date for the build out is quite favorable to Frontline. As Frontline acknowledges, many important aspects of the Frontline network remain to be negotiated with public safety. Frontline seems sanguine about the prospects for quick and easy resolution of the many outstanding issues, but even in a best-case scenario it seems unlikely that the negotiations would be complete before late 2008. *See Testimony of James L. Barksdale on Behalf of Frontline Wireless LLC, Before the Senate Committee on Commerce, Science and Transportation* (June 17, 2007), at 19 ("Furthermore the E Block licensee should begin to negotiate the

would potentially take the form of voice service revenues and data service revenues. In addition, the E-Block licensee would presumably have some roaming revenues from the mandatory roaming requirement that Frontline specifies.²⁹ Table 2 provides estimates of the number of end users Frontline might expect from MVNOs and other wholesale services once it begins providing service in 2013.

TABLE 2: MVNO SUBSCRIBER PROJECTIONS, 2013-2018

Year	2013	2014	2015	2016	2017	2018
MVNO Subs (m)	38.90	40.07	41.27	42.51	43.78	45.10
Frontline Share (%)	20	30	35	40	45	50
Frontline "Subs" (m)	7.78	12.02	14.44	17.00	19.70	22.55

Source: John Gauntt, *Mobile Virtual Network Operators: Mid-Life Crisis or Growing Pains?*, August 2006, at 1 (Gauntt's forecast extended through 2010. I conservatively assumed that MVNO subscribers would increase at 3 percent per year beyond 2010).

Note: By Frontline "Subs" I mean MVNO end-users that are on the Frontline network. In reality, the E-Block licensee would have only a limited number of commercial customers.

Table 2 shows that Frontline, through its commercial wholesale business, would have 8 million MVNO subscribers on its network after a four-year build-out process.³⁰ Presuming that Sprint-Nextel is the only other nationwide carrier that targets MVNOs as customers,³¹ I then ramp-up Frontline's share of the MVNO market to 50 percent by year 2017. Overall, under these assumptions, the number of commercial end users on the Frontline network would rise from 8 million to 23 million in the five-year period beginning in 2013.

details of the network sharing arrangement as soon as the auction is over, and aim to resolve that negotiation with the NPSL within six months at most. In the unlikely event negotiation was not successful, the E Block licensee would be bound by an arbitrator's conclusion as to what is a commercially and technically reasonable network design.... The resulting network sharing agreement will determine the design and features of the shared network between the E Block licensee and the NPSL.")

29. *Frontline Service Rules* at 25 (stating that the E-Block licensee should be required to provide roaming services because the roaming market is, allegedly, underserved at present).

30. Again, the underlying assumptions are favorable to Frontline. For example, to put the estimate of 45 million MVNO subscribers into perspective, consider the following: If there are 350 million people in the United States in 2018 and wireless penetration is 80 percent, then there will be 280 million wireless subscribers. If 45 million people purchase wireless service through MVNOs, then those carriers would represent 16 percent of the entire wireless market, which is approximately double the current MVNO market share. *See* FCC, *Local Telephone Competition: Status as of June 30, 2006*, released January 31, 2007, at Table 14, *available at* <http://www.fcc.gov/wcb/iatd/comp.html>.

31. RCR News, *By the Numbers*, July 10, 2006, at 8 (listing Sprint-Nextel as the carrier that provides network capacity to most of the major MVNOs).

Frontline's revenues from MVNOs will depend on revenues of the MVNOs themselves and hence their willingness to pay Frontline for wholesale spectrum. According to analysts, the average revenue to MVNOs for both data and voice service will be \$480 per year in 2010.³² The wholesale revenues from these end-users would, of course, be less than the retail revenues to the MVNO from those subscribers. Based on the approximate \$200 yearly cost per subscriber for handset equipment and sales, general, and administrative costs for possibly the most successful MVNO in the United States, Virgin Mobile, I find that Frontline could not reasonably charge more than \$280 per year for each MVNO subscriber on its network.³³ A more accurate estimate of Frontline's commercial revenues is probably the wholesale revenue currently generated by Sprint-Nextel, which makes \$117 per MVNO end-user per year.³⁴ To be conservative, I use the midpoint of these two numbers and assume that Frontline will enjoy commercial wholesale revenues equal to \$200 per year for each MVNO end-user on its network.

In addition to the revenues described above, Frontline expects to provide roaming services to small wireless carriers. Its revenues from such services will be a function of the amount of roaming traffic it carries, which will depend on the number of subscribers purchasing roaming service from one of Frontline's roaming carriers. I assume that the amount of roaming traffic is two-thirds of the network traffic generated by Frontline's MVNO customers in any given year. For example, according to the data in Table 2, Frontline will have 7.8 million MVNO end-users on its network in 2013. I assume that 5.1 million persons will purchase wireless plans through small wireless carriers that have roaming agreements with Frontline.

32. John Gauntt, *Mobile Virtual Network Operators: Mid-Life Crisis or Growing Pains?*, August 2006, at 1.

33. Virgin Mobile USA, Inc., 2007 SEC Form S-1 at 14, 16 (released May 1, 2007) (specifying equipment and SG&A costs of \$781 million in 2006 and average subscribers during 2006 equal to 3.957 million).

34. See Sprint Nextel Corp., 2007 SEC Form 10-K at 46, 47 (Released Mar. 1, 2007) (reporting "wholesale, affiliate, and other" revenues of \$859 million and 7.3 million wholesale and affiliate subscribers).

I base my assumption for the per subscriber fee paid by small roaming customers on the roaming fee paid by Cincinnati Bell, which is \$34.30 per end-user, per-year.³⁵ If Frontline's roaming customers purchase roaming service for 5.1 million end-users, the revenues to Frontline would equal \$175 million per year.³⁶

2. Services to Public Safety

In addition to the commercial wholesale revenues described above, Frontline would also receive revenues for providing service to public safety. I assume that the market for these services will ultimately equal forty percent of the 3 million first responders³⁷ located in tens of thousands of different agencies that will have the option to purchase service when the network is fully built-out. In the intervening years, I prorate the number of first responders by Frontline's stated coverage goals. Finally, I do not make assumptions on the revenues charged to public safety. Rather, I use the model below to determine the fees public safety would have to pay, in the form of recurring yearly fees per first responder, for Frontline to just break even by year 10.

C. The Business Model

Table 3 shows Frontline's cash position at the end of year four, i.e., January 1, 2013, but before it receives any revenue.

35. Cincinnati Bell Inc., 2004 SEC Form 8-K Exhibit 99.1, at 23 (Filed Oct. 5, 2004) (specifying \$16.5 million in roaming costs for its post 2004 roaming agreement); Janazzo, David, Adam Ilkowitz, and Michael Funk, The US Wireless Matrix 4Q04, Merrill Lynch, Industry Update, March 4, 2005, at 10 (listing Cincinnati Bell mobile subscribers at 481,000 during 2004).

36. Note that if Frontline were to strike a roaming deal with a larger carrier such as Sprint or Alltel, its roaming revenues from that deal would be nearly zero. Because those carriers' roaming deals are reciprocal, neither carrier makes significant margins from them. Furthermore, Frontline itself states that its mandatory roaming requirement is meant to provide roaming services to "mid-sized and rural carriers." See *Frontline FNPRM Comments* at 25.

37. Cyren Call Petition, at 7. Because first responders work in shifts, it is likely that they will share handsets and service rather than "doubling up" on those costs. Thus, the assumption that public safety agencies purchase subscriptions equal to forty percent of the number of first responders is essentially equivalent to full saturation.

TABLE 3: DEBT AFTER YEAR 4 (YEAR-END 2012)

Spectrum Cost	\$650 million
Network Capital Spending	\$17,285 million
Capitalized Interest (at 10 percent)	\$1,291 million
<i>Total Expenses</i>	<i>\$19,226 million</i>
Assumed Equity	\$5,000 million
<i>Debt Net of Equity</i>	<i>\$14,226 million</i>

The firm would have incurred \$650 million in costs to acquire spectrum, \$17.3 billion in network construction and operating cost. Assuming it obtains \$5 billion in equity capital and finances the remainder with debt at 10 percent,³⁸ it would incur an additional \$1.29 billion in interest expense.³⁹ Thus, Frontline would begin offering service in year five with \$14.2 billion in debt.⁴⁰

Table 4 lists Frontline's wholesale end-users and revenues, additional network build-out and operating costs, interest and debt for years five through ten. These estimates do not yet include any revenues from public safety users. I do assume wireless prices remain constant throughout the period.⁴¹

38. The yield on ccc-rated high-yield bonds has ranged between 9.24 percent and 11.33 percent in the past year. *See* Tracking Bond Benchmarks, Wall Street Journal, June 15, 2007. The midpoint of this range is 10.3 percent.

39. I assume that Frontline's "phase I" four year build-out will occur as follows: 10 percent in year 1, 20 percent in year 2, and 35 percent in years 3 and 4. The first \$5 billion in expenses would be covered by equity capital, after which it would incur debt at 10 percent. Furthermore, I assume that Frontline would not be forced to pay principal on that loan, but instead would pay down the principal out of net cash flow.

40. Frontline has provided no details about its proposed capital structure. Thus, these assumptions should be regarded as a simple proxy for whatever capital structure Frontline actually puts in place. Typically, start-up firms such as Frontline are financed initially by venture capitalists such as its current financial backers. (See John Markoff, "Silicon Valley Moneymen Make a Play for Airwaves," *New York Times*, April 9, 2007). Second round financing may come from other private equity investors, or from issuance of debt. To obtain equity capital of as much as \$5 billion, Frontline likely would have to execute a public stock sale (IPO). At this point, its initial venture capital investors would "cash out" some or all of their initial investment and, if the IPO is successful, earn a return of several times what they put at risk.

41. By not applying a price deflator to Frontline's revenue stream I am again being conservative. Historical experience has shown that real wireless prices have consistently decreased over time. *See, e.g., In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Radio Services*, Eleventh Report, FCC 06-124, WT Docket No. 06-17, (rel. Sept. 29, 2006), at tbl. 10, 106 [*"Eleventh CMRS Report"*] (listing average revenue per minute between 1993 and 2005 and the year-over-year percentage change in revenue per minute since 1994). Furthermore, when one adjusts the average monthly bill for inflation, one finds that consumers' average monthly

TABLE 4: PRO-FORMA FINANCIALS FOR FRONTLINE'S WHOLESALE BUSINESS
(DOLLAR FIGURES IN MILLIONS)

		Year 5 (2013)	Year 6 (2014)	Year 7 (2015)	Year 8 (2016)	Year 9 (2017)	Year 10 (2018)
A	MVNO end-users (millions)	8	12	14	17	20	23
B	Roaming end-users (millions)	5	8	10	11	13	15
C	Revenue ^a	\$1,732	\$2,676	\$3,216	\$3,786	\$4,387	\$5,020
D	Network Capital Spending	\$757	\$757	\$757	\$215	\$215	\$215
E	Op. Ex. (D x 0.4)	\$693	\$1,070	\$1,286	\$1,514	\$1,755	\$2,008
F	Net Rev. (C-D-E)	\$282	\$849	\$1,172	\$2,056	\$2,417	\$2,797
G	Start of Year Debt	-\$14,226	-\$15,339	-\$15,939	-\$16,243	-\$15,606	-\$14,508
H	Interest (10%)	-\$1,394	-\$1,449	-\$1,477	-\$1,419	-\$1,319	-\$1,171
I	Year End Debt ^b	-\$15,339	-\$15,939	-\$16,243	-\$15,606	-\$14,508	-\$12,883

Note: Network cost is the cost of improving network coverage during that year through additional cell sites, times \$600,000 per site. For years five through seven an 8 mile cell radius is used, and a 15 mile radius was applied to years eight through ten. To meet its coverage objectives, on average Frontline would need to cover 8.33 percent of the CONUS landmass each year.

^aEqual to $A * \$200 + B * \34.30

^bEqual to $F + G + H$.

The data in Table 4 indicate that Frontline's business model cannot be successful if it is to rely on wholesale revenues alone. At the end of year 10, Frontline would still have \$12.8 billion in debt.⁴² Its owners would still be awaiting their first dividend checks on their \$5 billion

wireless bill (unadjusted for minutes of use) has decreased since 1994. *Id.* (listing the average local monthly wireless bill since 1994); U.S. Bureau of Labor Statistics, CPI for All Urban Consumers: All Items Less Food and Energy, available at: www.bls.gov. When one adjusts the average local monthly bill by the Consumer Price Index, one finds that the average real local monthly wireless bill decreased between 2003 and 2005. When one uses the CPI for all Urban Consumers (including food and energy) the price decrease is even more significant. U.S. Bureau of Labor Statistics, CPI for All Urban Consumers, available at: www.bls.gov.

42. As noted above, I have not attempted to account for the impact of network refurbishment, replacement and obsolescence costs. (For example, radio equipment typically must be replaced every 5-7 years.) As a result, the

investment. If Frontline is to be able to pay down its debt and generate a return for its investors, it must make up the difference through fees charged to public safety.

Table 5 shows the fees Frontline would need to impose on public safety agencies in order to retire its debts at the end of 2018, ten years after the 700 MHz auction, so that it could begin generating returns for equity investors.⁴³

TABLE 5: FEES REQUIRED FROM PUBLIC SAFETY FOR FRONTLINE TO RETIRE ITS DEBT

	Year 5 (2013)	Year 6 (2014)	Year 7 (2015)	Year 8 (2016)	Year 9 (2017)	Year 10 (2018)
Coverage (% pops)	75	82	88	95	96	98
“Subs” (k)	900	980	1,060	1,140	1,156	1,172
Monthly Rev/Sub	\$120	\$120	\$120	\$120	\$120	\$120
Pub Safety Revenue	\$1,296	\$1,411	\$1,526	\$1,642	\$1,665	\$1,688
Total Net Revenue	\$1,578	\$2,260	\$2,699	\$3,698	\$4,081	\$4,484
Start of Year Debt	-\$14,226	-\$13,913	-\$12,819	-\$11,132	-\$8,178	-\$4,506
Year End Interest	-\$1,265	-\$1,165	-\$1,012	-\$743	-\$410	-\$2
End-of- Year Debt	-\$13,913	-\$12,819	-\$11,132	-\$8,178	-\$4,506	-\$24

Notes: Dollars in millions, except for monthly revenues per subscriber. Subscribers based on 40 percent of 3 million first subscribers, times coverage percentage. Public Safety Revenues are based on subscribers times \$1,440 per year. Total Net Revenue equals Net Revenues from Table 4, plus Public Safety Revenues.

The data in Table 5 are generated based on the assumption that Frontline is essentially debt free and beginning to generate returns to its investors as of January 1, 2019. As the table shows, in order to do so, it would need to receive access charges from public safety agencies of

model understates Frontline’s “out-year” costs. A more complete due diligence assessment would include allowances for these costs, which would substantially reduce (if not altogether eliminate) Frontline’s ability to retire its debt over the long run.

between \$1.3 billion and \$1.7 billion per year, or a total of \$9.23 billion over this six-year period. Putting these fees into perspective, total state and local first responder expenditures on communications services are estimated to rise from \$3.2 billion in 2006 to \$4.4 billion per year by 2011.⁴⁴ Based on the 2011 figure, Frontline’s access charges alone (not including the amount they would be required to spend on handsets and other equipment) would amount to between 30 percent and 39 percent of public safety’s total communications budget annually over this period. For public safety to “make room” for these access charges, it must either substantially increase its budget, which would require tax increases at either the local or federal level, or it must abandon communications investments that it has already planned.

Table 5 also shows a projected monthly subscriber charge of \$120 per month. This figure is based on the assumption that Frontline is successful in signing up 100 percent of the public safety agencies in its built-out footprint, and that each agency pays Frontline a monthly “per subscriber” fee for 40 percent of its personnel.⁴⁵ If fewer than 100 percent of agencies sign up, or if agencies purchase subscriptions for less than 40 percent of personnel, the monthly fee would be higher.

43. Note that the equity investors presumably have already begun pumping money into the firm to finance Frontline’s various legal and lobbying efforts.

44. Kate McCurdy, *Government IT: US Public Safety Technology Spending to Grow 7% Over Next Five Years*, COMPUTER BUSINESS REVIEW ONLINE, Jan. 10, 2007.

45. See discussion above. The assumption that 40 percent of first responders will be paid users is conservative. Using the CapWIN system in the DC metropolitan area as a benchmark, I find that of the capital area agencies that use the network, fewer than 40 percent of the first responders at those agencies are CapWIN users. There are 1,700 CapWIN users. See Carolyn Duffy Marsen, *DC Deploys Wireless Net for First Responders*, NETWORKWORLD, Aug. 31, 2006. A list of agencies that use the CapWIN network is available at <http://www.capwin.org/index.cfm?fuseaction=t2&ID=24>. A review of those agencies shows that there are nearly 4,200 first responders at a select few of them. There are nearly 1,000 call responders in Fairfax County Police Dept., 220 in Howard County Police Dept., 540 in Montgomery County Police Dept., 595 in Prince Georges County Police Dept., 260 in Arlington Police Dept., and 499 in Norfolk Police Dept. See U.S. DEPT. OF JUSTICE, LAW ENFORCEMENT MANAGEMENT AND ADMINISTRATIVE STATISTICS 2000, March 2004, at table 1a. Therefore, agencies that use the WinCAP network have no more than 40 percent of call responders on that system.

IV. RISK FACTORS

The projections above assume everything goes smoothly. Build-out goals are achieved on time and on budget; technological challenges are surmounted; the services offered are attractive to customers, who respond by signing up at the projected rates. All of these assumptions are, of course, subject to risk. But as any seasoned investor knows, things seldom go as planned. No less authority than Frontline investor John Doerr (a partner at Silicon Valley venture capital firm Kleiner Perkins Caufield & Byers) has written that investors must “ruthlessly evaluate risk” before signing on to a business plan.⁴⁶ Before helping to capitalize Frontline, public safety agencies and the U.S. government should also be aware of the substantial risks embedded in its business plan. The discussion below, which is by no means exhaustive, briefly identifies three major types of risk factors they should consider.

A. Execution Risk

The most obvious execution risk facing Frontline is its ability to meet its network build-out commitment to “provide 25 percent geographic coverage of the continental United States within four years of license grant.”⁴⁷ To do so, it will need to locate, acquire, construct, install, test, and activate approximately 30,000 cell sites within four years.⁴⁸

Frontline’s ability to achieve this objective must be seen in light of the fact that there are a finite number of suitable cell sites in U.S. urban areas, many of which are already occupied by other wireless carriers that have spent the last 10 (PCS carriers) to 20 (cellular carriers) years identifying and building out their networks, using both in-house resources and contractors. For

46. JUSTIN J. CAMP, VENTURE CAPITAL DUE DILIGENCE: A GUIDE TO MAKING SMART INVESTMENT CHOICES AND INCREASING YOUR PORTFOLIO RETURNS 69 (John Wiley & Sons Inc., 2002) [hereinafter *Venture Capital Due Diligence*].

47. *Frontline Service Rules* at 12.

Frontline to go from no sites to 25 percent geographic coverage in four years would be a monumental achievement. A material lag in reaching the 25 percent target would: (a) delay Frontline's generation of revenue; (b) increase its requirement for borrowed capital; and (c) lock in more years of operating losses, thus raising the risk of insolvency and potential bankruptcy.⁴⁹

B. Technical Risk

A second type of risk investors must consider is technical risk—i.e., whether the technological hurdles facing the business will in fact be surmounted.⁵⁰ One significant technical risk in Frontline's business plan is the risk that the technology required to permit seamless, preemptible shared use of Frontline's spectrum will either (1) not be available in the next three-to-five years or (2) will not be available in mass produced numbers with economies of scale pricing. For Frontline's plan to succeed, the technology needed to ensure that commercial users are "unconditionally preemptible" in favor of public safety users must become available soon and at reasonable prices. Therefore, the technical risk in Frontline's proposal is real.

Frontline's ability to overcome this technical challenge is of particular importance for its prospective public safety customers. Frontline proposes to fulfill its commitment to providing "priority access"⁵¹ to public safety through the use of IP switching technology.⁵² This means that its plan does not involve public safety having control over the network in times of emergency. Rather, public safety's data would simply have priority access over commercial data that is also

48. There are over 3 million square miles in the continental United States. Twenty-five percent geographic coverage therefore requires coverage of 761 thousand square miles in urban and suburban areas. Assuming an average cell radius of 2.9 miles the number of cells required to provide service is $761 \text{ thousand} / (3.14159 \times 8.4) = 28,800$ cell sites.

49. The difficulties and setbacks that Sprint PCS faced while it built out its nationwide network in the 1990s serve as an example of this type of risk. *See, e.g.,* Denise Pappalardo, *Nortel Software Slows Sprint PCS*, NETWORK WORLD, Dec. 16, 1996, available at: http://findarticles.com/p/articles/mi_qa3649/is_199612/ai_n8750533.

50. *Venture Capital Due Diligence* at 69. ("[o]ne type of risk that venture capitalists concentrate on heavily is *technical risk*—the risk that companies will not be able to actually develop viable technologies as planned.")

51. *Frontline Service Rules* at 8.

52. *Frontline Service Rules* at 14-15.

traveling on the shared network. If the IP switching technology proves to be less reliable than Frontline's backers expect, or if public safety is required to make significant investments in handsets to facilitate priority access, the promise of "unconditional preemption" could turn out to mean less in practice than public safety users may expect.

C. Market Risk

Frontline's market risk is the possibility it will be unable to find enough customers willing to purchase its products at prices sufficient to generate the revenues necessary to service its debt and operate its network. Frontline's market risk has two crucial components: (1) the risk that Frontline has overestimated the revenue potential of its target markets and (2) the risk that it has underestimated the likely reactions of market forces to a new entrant. Frontline has identified three target markets: (a) wireless carriers that require roaming support; (b) Mobile Virtual Network Operators (MVNOs) that would be wholesale customers; and (c) public safety users. For Frontline to succeed, these target markets must generate the cash required for Frontline to cover debt service, operating costs and a return on capital for its investors.

1. Likely Customer Base

Venture capitalists utilize a variety of tools to assess a company's ability to attract and retain customers. One simple framework is known as Alsop's formula:⁵³

$$(1) \quad \textit{Quality} + \textit{Innovation} + \textit{Smarts} + \textit{Money} - \textit{Pain}^2 = \textit{success}$$

In assessing quality, investors must determine whether the product works or whether it will work in the future.⁵⁴ As noted above, the technology required for Frontline's network sharing business model to succeed is still on the drawing board. Since the technology is still in

53. *Venture Capital Due Diligence* at 68.

54. *Id.*

the development phase, it is difficult if not impossible to assess the quality of service it will provide. Therefore, Frontline's quality is suspect.

For a product to be innovative, it must “do something that people want that it couldn't do before.”⁵⁵ For Frontline's product to be successful, end-users must demand the voice and data products offered by MVNOs. Because those products are already offered today, it is not at all apparent that Frontline's product is innovative. Furthermore, it bears note that the amount of innovation of Frontline's retail products will be determined *by MVNOs and not by Frontline*. If MVNOs fail to offer innovative products, then Frontline will fail too. Finally, Frontline would be providing priority access to public safety during times of emergency. However, wireless service is likely most valuable to *both* public safety and commercial users during times of emergency. It is therefore unlikely that commercial end-users would be willing to pay full retail rates for a service that sends their data packets to the back of a cue when a large-scale emergency occurs.

For a business plan to be characterized as “smart,” management must understand product delivery and must be able to communicate with its customers.⁵⁶ While Frontline's backers are unquestionably sophisticated and highly successful investors, and its executives (former FCC Chairman Reed Hundt and NTIA Administrator Janice Obchuowski) are highly respected former government officials, the company has not yet announced a management team with significant experience in operating commercial mobile radio services or marketing such products to customers.

One component of Alsop's formula that would seem to work in Frontline's favor is money, as Frontline's announced backers include several very wealthy Silicon Valley investors.

55. *Id.*

56. *Id.*

However, the company has not revealed the extent of its backers' commitments, nor is it clear the extent to which even its investors have conducted a serious due diligence exercise.⁵⁷

The pain variable is squared in Alsop's equation because it is regarded as the most important component of a product's success.⁵⁸ According to Alsop, pain is a measure of the effort that the customer must exert for the product to work. Again, because the technology for Frontline's service is still in development, it is simply not possible to predict how "user friendly" it will be. At a minimum, however: (a) commercial users will suffer some inconvenience when public safety traffic is at peak levels and their traffic is passed to the "back of the cue"; and, (b) public safety users will suffer to the extent the IP-based pre-emption technology fails to provide the level of prioritization they expect and require.

One market risk that bears special note is Frontline's ability to win what amounts to 100 percent of the public safety market. In the model above, I assumed that 100 percent of public safety agencies subscribe to the Frontline service, that they do so immediately as the network becomes operational in their regions, and that they purchase subscriptions equal to 40 percent of their personnel. These assumptions are extremely aggressive. Some localities, such as New York and Washington, are already building their own broadband networks, and may decide not to incur the substantial additional costs necessary to subscribe to Frontline. Others may find they are unable to fund handsets for what amounts to 100 percent of on-duty personnel at a given time; they may purchase a few subscriptions, and share the equipment and accessibility more widely across their workforces. Still others may simply conclude the benefits of Frontline do not

57. *Frontline FNPRM Comments* at 58. A troubling signal on this front emerged at a Senate Commerce Committee hearing on June 14, 2007, when Frontline partner James Barksdale testified that public safety agencies would not be required to pay access fees to use the network, only to have to correct his testimony later in the hearing. If Frontline's major backers have not taken time to study up on such basic elements of the business model, it is reasonable to question the depth of their commitments to making the multi-billion dollar investments the plan would require. See Heather Greenfield, "Spectrum: Senators Probe Bidders, Users on Spectrum Auction," *National Journal Technology Daily* (June 14, 2007).

exceed the costs. Every public safety agency which decides not to participate fully in the Frontline system will increase proportionately the cost that would need to be borne by others.⁵⁹

2. Market Responses

First-mover advantage and market share are keys to the success of a business. The first-mover advantage is important because it allows a company to reach customers before another firm. Indeed, when a company lacks a first-mover advantage and when it is subject to competition by rival firms, venture capitalists are reluctant to invest in the company.⁶⁰ Obviously, Frontline would have no first-mover advantage for its commercial business. There are already four major nationwide wireless carriers, Verizon Wireless, AT&T, Sprint-Nextel and T-Mobile, plus “super-regional” Alltel. Furthermore, SpectrumCo is in a position to enter as a sixth carrier with its spectrum purchases in the AWS auction in 2006. Frontline’s prospective MVNO customers will only purchase service from Frontline if they themselves can survive and prosper in the market against five or more nationwide carriers – which, despite Frontline’s rhetoric to the contrary, have a track record of rapid product innovation.

Venture capitalists are at times willing to invest in a firm without first-mover advantage if they believe that firm can quickly increase its market share.⁶¹ However, Frontline’s ability to gain a significant share of the MVNO market is uncertain, and depends on the reactions of its competitors. Established wireless competitors can be expected to react to a new entrant by adjusting prices, product offerings, and service levels in order to retain market share and maintain margins to the extent possible. The Frontline business plan as glimpsed through its public filings displays no expectation as to the action-reaction cycle that should be expected in

58. *Venture Capital Due Diligence* at 68.

59. Note also that Frontline’s commercial revenues depend on its ability to offer a nationwide network. If public safety agencies in places like New York and Washington chose not to participate, Frontline would still have to build the network for use by commercial users.

any market as competitive as wireless data and voice in the United States. To be successful, Frontline would have to take share from established competitors in a competitive market, a process that, under the best of conditions, will take time and capital. The model developed above assumes Frontline captures 50 percent of the MVNO market within five years of beginning operations, despite having a network that provides far less extensive coverage than the existing carriers.

V. CONCLUSIONS

Before investing in start up companies, venture capitalists conduct extensive due diligence exercises. They require, for example, “balance sheets, income statements and cash flow projections for five years, with the information presented monthly for the first year and quarterly thereafter . . . [it] is essential to the credibility of the financial forecasts that the assumptions be realistic, logical, attainable and either consistent with industry norms or any deviation explained.”⁶² Still, many startups fail. Kleiner, Perkins, Caufield and Byers, the most successful Silicon Valley venture capital firm, has had many successes, including early investments in Amazon.com and Google. It has also invested in many firms that ultimately did not succeed, such as the ill-fated competitive local exchange carriers.⁶³ Starting a new company is an inherently risky business.

With only weeks to go before making a decision on whether to invest billions of dollars worth of public resources in Frontline Wireless, neither the FCC nor public safety agencies have subjected the Frontline proposal to anything approaching the level of scrutiny its venture capital backers would apply before investing a single dollar. Yet, the government investors are the only

60. *Id.* at 93.

61. *Id.*

62. *Venture Capital Due Diligence* at 202 (quoting John Doerr and Alan Salzman).

ones involved with no apparent exit strategy. Frontline's financial backers can sell their shares to other investors, either in the private equity market or through an IPO. If they time it right, they may make substantial returns, even if the scheme ultimately fails. But the E-Block spectrum, once licensed to Frontline, cannot easily be recovered; and, public safety's commitment to the plan would seem, for all practical purposes, irreversible.

The analysis above raises serious questions about whether Frontline's business plan can deliver on its admittedly appealing promises. We would all like to believe it is possible to construct and operate a highly advanced, nationwide, interoperable public safety broadband network without a single dollar of up front government investment. It seems too good to be true—and it probably is.

63 See, e.g., Corey Grice, "Making Waves in the Data World," CNET News (February 22, 1999); see also Larry F. Darby, Jeffrey A. Eisenach and Joseph S. Kraemer, "The CLEC Experiment: Anatomy of a Meltdown," (The Progress & Freedom Foundation, September 2002).